

### **REMARKS**

This document responds to an Office action dated 08/05/2010 and is accompanied by a Request for Continued Examination.

Claims 1, 3-7, and 9-18 were presented for examination and were rejected. The applicants respectfully request reconsideration in light of the amendments and the following remarks.

Claims 2 and 8 were previously canceled.

All pending independent claims are currently amended.

#### **Overview of The Distinguishing Characteristics of the Present Invention**

In support of the arguments below, the applicants distinguish a number of important characteristics of the present invention, some of which were previously articulated.

**First**, regarding terminology, applicants' specification states that the term "term" "may comprise a word or a word class." (Specification, page 7, lines 12-13; see also page 3, line 9). The incoming natural-language word(s) to be classified by the joint classifier are to be distinguished from words in a corpus. Thus, for clarity, the claim language recites "word" in reference to the former and "word-term" in reference to the latter.

**Second**, in contrast to prior art, the present invention relies on a distinctive combination of at least two different kinds of sources of terms to be used by the disclosed joint classifier:

[T]he joint classifier 112 uses a joint classification technique, based on **both** word terms **and** word term classes, to classify natural language speech received via one or more incoming calls or other communications from network 104. The word terms and word term classes are generally referred to herein as words and classes respectively.

(Specification, page 4 line 27 to page 5 lines 1-3 (emphasis added)).

. . . .

Words **and** word classes [are] utilized to provide the respective word information and word class information for use in the joint classifier . . . .

(Specification, page 2, lines 25-27 (emphasis added)).

. . . .

The illustrative embodiment utilizes an automatic word class clustering algorithm to generate word classes from a training corpus, and information gain (IG) based term selection **to combine word information and word class information** for use by the joint classifier.

(Specification, page 7, lines 1-3 (emphasis added)).

The joint classifier disclosed in the present application is based on the combination of at least one source of word terms and at least one source of word-classes. (See also Specification, Figure 5 and accompanying text at page 11). This distinctive combination of terms tends to ameliorate the defects of classifying based on automatically generated word classes. (Specification, page 9, lines 13-19).

**Third**, the present invention uses information-gain (IG) calculations to select only certain terms from the above-mentioned combination of terms before it executes the classification functions of the joint classifier.

**Fourth**, the present application discloses a unique feature – namely that the IG-based selection of terms is from the distinctive combination of terms. Therefore, it is possible, according to the present invention, to select both word-terms and word-classes from the combination. Prior art disclosures foreclose this possibility.

Thus, according to the present invention, depending on the word or words received in the communication, both word-terms and word-classes could populate the term-category matrix that ultimately directs the routing of the communication. As explained in applicants' specification, the result is much more robust than prior art classifications that foreclose this possibility. This distinctive feature is discussed in more detail in the remarks below.

### **35 U.S.C. § 103 Rejection of Claims 1, 3, 5-7, and 9-18**

Claims 1, 3, 5-7, and 9-18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Li et al., "Improving Latent Semantic Indexing Based Classifier with Information Gain," 7<sup>th</sup> International Conference on Spoken Language Processing, Sep. 2002 (referred to simply as "Li" in the pending office action, but hereinafter "**Li-2002**"), in view of Diab et al., "An Unsupervised Method for Word Sense Tagging Using Parallel Corpora," Proceedings of the 40<sup>th</sup> Annual Meeting of the Ass'n for Computational Linguistics, July 2002 (hereinafter "**Diab**"). The applicants respectfully submit that the amended claims overcome this rejection.

**Claim 1** as amended recites:

**1.** A method comprising:

receiving, by a processor-based device, a communication that comprises a word that is a natural-language word;

identifying, by the processor-based device, the word received in the communication;

utilizing by the processor-based device **a combination of terms that comprises:**

**(i) a set of word-terms, and**

**(ii) a set of word-classes,**

**wherein a term is one of a word-term and a word-class;**

**selecting** by the processor-based device **a plurality of terms from the combination of terms**, wherein the selecting is based on an information-gain value of those terms in the combination that correspond to the word;

generating by the processor-based device a matrix, wherein:

(i) the matrix comprises a plurality of categories and the plurality of terms, and

(ii) each term in the matrix is associated with at least one category; and

determining from the matrix, by the processor-based device, a category for the word.

(emphasis added)

Nowhere do the cited references, taken alone or in combination, teach, suggest, or motivate what amended claim 1 recites in salient part – namely:

- selecting a plurality of terms (wherein a term is one of a word-term and a word-class)
- from a combination of terms that comprises (i) a set of word-terms and (ii) a set of word-classes.

As explained above and in applicants' specification, the use of a combination of terms from multiple and diverse kinds of sources, and particularly the combination of word-terms and word-classes, provides the present invention with added robustness and performance

improvement over the prior art. The Office concedes, and the applicants agree that Li-2002 does not suggest or motivate the combination of terms. (Office Action, page 4).

As to Diab, the applicants address the contentions set forth by the Office as follows.

**First**, the Office contends that "Applicant does not claim that the word that the generation is based on was derived from the communication, so as long as the generated data includes the word that also exists in the communication, it is 'based on the word' that the communication 'comprises.'" (Office Action, page 5).

Aside from the general fact that any body that includes an item cannot be considered, *ipso facto*, to be "based on" that item, the applicants have amended claim 1 as follows:

receiving, by a processor-based device, a communication that comprises a word that is a natural-language word;

**identifying, by the processor-based device, the word received in the communication;**

**generating utilizing** by the processor-based device a combination of terms[[],] **~~based on the word, comprising that comprises:~~**

(Claim 1, amendments included)

Based on the amended language, the applicants respectfully submit that amended claim 1 overcomes the "based on" contention raised by the Office.

**Second**, the Office further contends that Diab "teaches/suggests generating . . . a combination of terms," and further that "the sense-annotated words in the [Diab] corpus, collectively, are a 'combination of terms' because the classes/senses [in Diab] are combined with their corresponding words." (Office Action, page 5).

Contrary to the Office's contention, the senses in Diab are not combined with words in the same way as the distinctive combination of the present invention. Moreover, Diab teaches away from the selection of terms according to claim 1. Nowhere does Diab disclose the possibility of selecting both a word-term and a class-term (on whatever basis, not necessarily IG) for classifying a word. Diab forecloses the possibility of selecting anything

except a sense of a word. Thus, in comparative terms,<sup>1</sup> Diab precludes the selection of a word-term because it only seeks to find a word-class.

Diab is generally directed at finding a sense for a word in language A, by exploiting translations of A available in language B, and further exploiting the availability of sense data for language B words. (Diab, page 255, col. 2). Diab uses French as language A and English as language B. Diab seeks to find a sense for the French word "catastrophe." English has multiple translations for "catastrophe" and also has sense inventories.

Diab maps the French "catastrophe" to a set (the "target set") of English translations: {disaster, tragedy, situation}. (Diab, page 257, col. 1). In this target set, the word "tragedy" is sense-ambiguous, because it can have the sense of "CALAMITY" or the sense of "KIND-OF-DRAMA."

Diab maps "tragedy" to two candidate senses: CALAMITY and KIND-OF-DRAMA. The other two words in the target set do not have multiple senses in this example. The candidate senses for "tragedy" are analyzed with respect to the other words in the target set, seeking to find reinforcement for one or the other of the senses. (Diab, page 257, col. 2). If one of the candidate senses receives a high confidence score, it becomes the chosen sense to be associated with the French "catastrophe." (Diab, page 257-58). In Diab's example, CALAMITY is a proper sense for tragedy in the context of the target set of {disaster, tragedy, situation}, and therefore CALAMITY and "catastrophe" become associated. (Diab, page 258, col. 1)

Importantly, the translated words of the target set are not combined with the candidate senses, because only the senses are candidates for selection, not the target words. Thus, Diab does not produce a combination like the distinctive combination of word-terms and word-classes recited by claim 1.

Furthermore, Diab teaches away from the salient selection feature of the method of claim 1, because Diab seeks to select a sense, and only a sense, to be associated with a source word. In contrast, the method of claim 1 provides for the possibility of both a word-term and a word-class (or more than one) being selected relative to a word of interest. In

---

<sup>1</sup> The applicants do not concede that "sense" in Diab is synonymous to "word-class" in the present invention. At a certain level of abstraction, however, a sense in Diab maps to a plurality of words having that sense; likewise a word-class in the present invention maps to several words corresponding to that class. Thus, based on a one-to-many relationship, the sense and word-class concepts can be compared.

fact, the presence of both word-classes and word-terms in the distinctive combination of the present invention provides the added robustness of the disclosed joint classifier.

In sum, although it may appear at first glance that Diab's "target sets" and candidate senses are analogous to the distinctive combination of the present invention, a careful reading of Diab indicates that it discloses neither the compositional relationships of, nor the functional selection from, the distinctive combination of claim 1.

Moreover, because of the disparate paradigms of Diab and the method of claim 1, there is no combination of Li-2002 and Diab that teaches, suggests, or motivates the method of claim 1.

**Third**, the Office further asserts that a "simple substitution of one corpus" for another in Li-2002 "would have been obvious." (Office Action, page 6). The applicants respectfully submit that, as previously noted, Li-2002 does not disclose more than one corpus. Since the present invention expressly discloses a combination of two different types of data to form the distinctive combination from which selections are made, there is no "substitution" at issue.

Further, the Diab multi-step analysis would never work with a "substitution," because it relies on mapping from one word to a target set to candidate senses. These concepts cannot reasonably be "substituted" or combined with Li-2002.

For all these reasons, the applicants respectfully submit that amended claim 1 overcomes the rejection and is allowable over the cited references.

Because they depend from claim 1, claims 3, 5-7, and 9 are likewise allowable. Moreover, the recitation of additional patentable features in these claims forms an added basis for their patentability.

**Claims 10, 12, 15, and 18.** Independent claims 10, 12, 15, and 18, as amended, comprise the salient limitations recited above with respect to claim 1. For the same reasons given in support of claim 1, the applicants respectfully submit that these claims are likewise allowable over the cited references.

Because they depend from these independent claims, claims 11, 13-14, and 16-17 are likewise allowable. Moreover, the recitation of additional patentable features in these claims forms an added basis for their patentability.

**35 U.S.C. § 103 Rejection of Claim 4**

Claim 4 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Li-2002 in view of Diab as applied to claim 1, in view of of Sakai et al., U.S. Patent No. 7,099,819 B2 (hereinafter "Sakai"). The applicants respectfully traverse.

Claim 4 depends from claim 1. Sakai does not cure the deficiencies of Li-2002 and Diab with respect to claim 1.

For example, Sakai's method of word clustering (to create word classes) does not teach, suggest, or motivate a combination of terms that comprises both word classes and individual word terms – in contrast to the salient limitation of claim 1. Sakai's category analysis cited in the Office action does not pertain to the salient limitations as recited in claim 1, because Sakai discloses no combination of word terms and word classes.

Because it depends from claim 1, claim 4 is allowable over the cited references. Moreover, the recitation of additional patentable features in this claim forms an added basis for its patentability.

**Request for Reconsideration Pursuant to 37 C.F.R. 1.111**

Having responded to each and every ground for objection and rejection in the last Office action, applicants respectfully request reconsideration of the instant application pursuant to 37 C.F.R. 1.111 and request that the Examiner allow all of the pending claims and pass the application to issue.

If there are remaining issues, the applicants respectfully request that Examiner telephone the applicants' attorney so that those issues can be resolved as quickly as possible.

Respectfully,

Wu Chou et al.

By **/Josephine A. Paltin/**

Josephine A. Paltin

Attorney for Applicants

Reg. No. 62587

732-578-0103 x228

DeMont & Breyer, L.L.C.

Suite 250

100 Commons Way

Holmdel, NJ 07733

United States of America